

Afternoon Brainstorm:

Enabling GW 35° C heat
dissipation to air – without
evaporating or heating surface
water



Objective

Identify

- Key challenges & needs
- Transformational technological approaches
- Technical and economic metrics

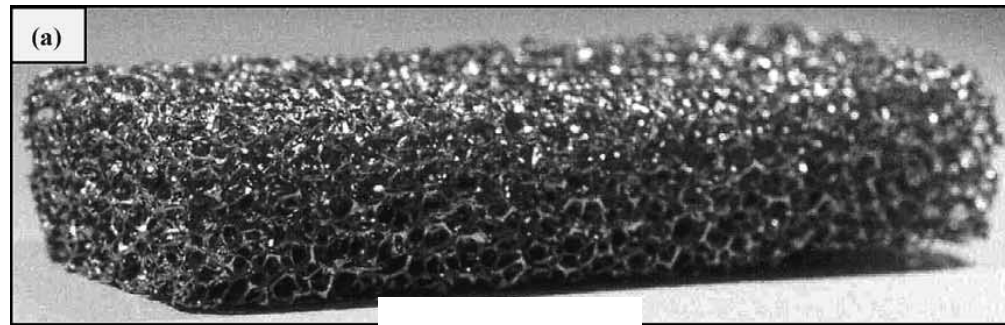


Dissipating GW of 35° C Heat to Air

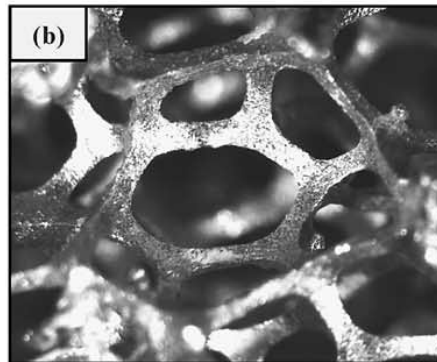
- Increase surface area
- Increase heat transfer coefficient
- Increase passive or forced convective air flow rate
- Decrease parasitic load
- Innovative concepts, geometries / topologies, materials, manufacturing processes



Increase Surface Area – thermally conducting polymer, metal foam



← 10 cm →



← 7 mm →

Increase Air Speed – elevate condenser, use hyperbolic tower, Venturi effect

Wind ~10 m/s at 100 m



Increase Heat Transfer Coefficient

- Acoustic
- Coatings
- Nanostructures



Are there any technical advances in the last 10 years that may help us find a solution?



What new materials exist for GW to-air HXs?

Can we invent new materials for this?

What limits current materials?



Are there new manufacturing processes for current or novel HX materials?



Can we efficiently lower the onset of turbulent flow using

- Electrohydrodynamics
- Magnetohydrodynamics?
- Acoustics?



Are there surface treatments that might raise the to-air heat transfer coefficient?



Can we take advantage of thermosiphoning
inside or outside HXs?

Venturi effect?



Are there completely new HX designs we haven't thought of?



Metrics

- Impactful if met
- Technically audacious
- Potentially achievable



What program metrics would likely produce a successful project in 3 years, such that it would be accepted and deployed in 15-10 years?



What can be done with \$3-4M in 2-3 yrs?

What can be done with \$0.5M in 1yr?



Agenda

Start	End	Activity
8:00	8:15	Registration & Breakfast
8:15	8:30	Welcome & Opening Remarks – Nicholas Cizek, ARPA-E
8:30	8:50	Power Plant Cooling – Olivier Le Galudec, Alstom
8:50	9:10	Dry Power Plant Cooling State of the Art – John Maulbetsch, Maulbetsch Consulting
9:10	9:30	Electronics Cooling State of the Art – Howard Davidson, Consultant
9:30	9:45	BREAK
9:45	11:45	Brainstorm – Technologies Enabling Dry Cooled Power Plants with Wet Cooled Power Plant Efficiencies or Better
11:45	12:45	Lunch & Review Morning Brainstorm
12:45	2:45	Brainstorm – Dissipating GW-scale Low-grade (35° C) Heat to Air Without Evaporating Water or Raising Surface Water Temperature
2:45	3:00	BREAK
3:00	3:30	Review Afternoon Brainstorm & Wrap-Up